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SI-M-SWOT: A Problem-Based Learning Model with Game Technology to Teach SWOT Analysis in Marketing in Higher Education in East Java, Indonesia

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Abstract. The ability to conduct SWOT analysis is an essential competency in marketing education. However, conventional teaching approaches may not always provide interactive and contextually relevant learning experiences. This study intends to develop and evaluate SI-M-SWOT. The interactive learning model integrates Problem-Based Learning (PBL) and game-based learning to enhance the teaching and learning of SWOT analysis in marketing education. This study employed a Research and Development (R&D) approach using the ADDIE framework, which comprises five stages: Analysis, Design, Development, Implementation, and Evaluation. The model was piloted with 133 undergraduate students across four universities in East Java, Indonesia. Data collected through observations, questionnaires, and pre- and post-tests were analyzed using descriptive statistics and paired-samples t-tests. The paired-samples t-test results revealed statistically significant improvements in SWOT analysis comprehension scores across all participating universities ($t = -3.93$ to -9.68; $df = 26–44$; $p < 0.001$), with effect sizes ranging from moderate to very large (Cohen's $d = 0.59–1.86$; pooled $d \approx 1.06$; $N = 133$). Mean scores increased by 15.80 to 28.74 points (24.7%–44.3%) across the participating universities. The findings also indicated positive improvements in students' critical thinking skills and participation. The integration of SI-M-SWOT and PBL provided a more

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engaging and student-centered learning experience. In addition, students reported increased learning motivation and demonstrated improved analytical skills in addressing real-world marketing problems. Overall, the findings provide statistical evidence supporting the effectiveness of the SI-M-SWOT model for teaching SWOT analysis in marketing education. Therefore, the SI-M-SWOT model shows potential for implementation in higher education settings.

Keywords: Problem-Based Learning; Game-Based Learning; Marketing SWOT Analysis; ADDIE Framework; Higher Education

1. Introduction

Traditional teaching methods in marketing courses face challenges, including low student engagement and difficulties in developing a deeper understanding of course concepts. Game-based learning technologies have the potential to increase student engagement and motivation while supporting conceptual understanding. Many students use AI-based technologies, such as ChatGPT, to answer questions or complete academic assignments (Gasaymeh et al., 2025; Hasanein & Sobaih, 2023; Sri Setyani, 2024). However, some students may rely on AI-generated responses without fully understanding the information provided. This reliance may hinder the development of conceptual understanding, particularly when AI tools are used primarily to obtain answers rather than to support the learning process. In the context of marketing education, this issue is particularly relevant to complex analytical topics such as SWOT analysis (Benzaghta et al., 2021; Mai et al., 2024).

Instruction in marketing SWOT analysis provides an important foundation for developing effective marketing strategies. However, teaching SWOT analysis presents several challenges, including low student engagement, difficulties in applying theoretical concepts to practical contexts, and limited interactivity in learning activities (Azhari, 2020; Sri Setyani, 2023). To address these challenges, this study integrates game-based technology into an e-learning model that adopts a Problem-Based Learning (PBL) approach. Previous research suggests that the integration of these approaches can promote greater student interaction and engagement (Munawaroh et al., 2021, 2024). The use of digital learning content, including instructional videos, simulations, and game-based applications, can further enrich the learning experience. Such interactive content may also facilitate students' understanding of complex concepts (Babichenko & Asterhan, 2013).

Problem-Based Learning (PBL) integrated with game-based technology has been reported to support student engagement and conceptual understanding (Babichenko & Asterhan, 2013). Building on this approach, this study intends to develop an AI-based marketing SWOT game model designed to enhance students' Learning Motivation (Magareta, 2021; Narcisa, 2020). The learning process begins with a flipped classroom model that provides students with the necessary instructional materials before classroom activities (Abdullah et al., 2019; Arnata et al., 2020; Sri Setyani, 2023). Students then select marketing SWOT scenarios prepared by the lecturer based on their interests and analyse them.

Within this learning model, students actively analyze the cases and present their findings through video presentations. These presentations provide a basis for discussion and assessment of students' critical and analytical thinking skills, as well as their ability to communicate their ideas effectively (Munawaroh et al., 2024; van Alten et al., 2020; Yamin & Syahrir, 2020).

Recent studies have highlighted the importance of experiential learning approaches in enhancing student engagement and conceptual understanding. Compared with traditional teaching methods, approaches such as business simulations, client-based projects, and authentic learning activities can improve knowledge transfer and provide more meaningful learning experiences (Chugh et al., 2023). In entrepreneurship education, the integration of real-world experiences, including virtual laboratory activities and business consulting projects, has been associated with improvements in entrepreneurial competencies and learning motivation (Motta & Galina, 2023). Furthermore, SWOT analysis has been widely used as a strategic framework for examining organizational systems and identifying their internal strengths and weaknesses, as well as external opportunities and threats. This framework can also be applied to digital learning environments, including Learning Management Systems (LMS), to support systematic assessments of institutional strengths and challenges (Widarini et al., 2025).

The lack of interactive and contextually relevant learning materials that demonstrate the practical application of SWOT analysis remains a significant challenge in marketing education. Learning activities often rely on didactic approaches in which lecturers primarily deliver theoretical explanations, while students have limited opportunities for active participation. Consequently, students may have fewer opportunities to analyze authentic business cases, explore alternative strategies, and develop critical thinking skills. These challenges highlight the need for innovative learning models that promote active participation and provide students with opportunities to conduct strategic analyses within realistic business scenarios.

Previous studies have indicated that E-learning within a problem-based Flipped Classroom (FC) model can be an effective teaching strategy in marketing education (Limaymanta et al., 2021; Rahmawati & Setyani , 2023). Similarly, Dalila et al. (2022) and Munawaroh et al. (2022) reported that AI-based e-learning platforms can provide more personalized and adaptive learning experiences. The integration of technology into education can broaden students' access to diverse learning resources (Amris & Desyandri, 2021; Dogan, 2017). Such technologies also enable students to access learning materials anytime and anywhere, thereby supporting more flexible and self-directed learning according to their individual needs (Munawaroh et al., 2022; Munawaroh & Setyani, 2022).

Prior research has demonstrated that Problem-Based Learning (PBL) in marketing and business education can strengthen students' critical thinking skills while helping to bridge the gap between theoretical knowledge and practical application (Chugh et al., 2023; Rosário & Dias, 2024). Furthermore, case-based

learning incorporating SWOT analysis has been reported to enhance students' ability to formulate marketing strategies applicable to real-world business contexts (Adawiyah et al., 2025). Taken together, these findings suggest that integrating SWOT analysis into a problem-based learning environment may foster a more meaningful and practice-oriented learning experience.

In recent years, the integration of educational technology has expanded opportunities to develop innovative learning environments. Game-based learning technologies can engage students in business simulations, expose them to complex decision-making scenarios, and provide immediate feedback on their strategic choices. The contribution of this study lies in the development and empirical evaluation of the SI-M-SWOT learning model, which integrates Problem-Based Learning (PBL), interactive game technology, SWOT simulation, and the ADDIE instructional design framework within a unified pedagogical model for marketing education. Although previous studies have examined PBL, game-based learning, and SWOT-based case analysis, this study explores their integration within a digital learning environment that enables students to analyze authentic business problems, formulate marketing strategies, receive immediate feedback, and collaboratively develop alternative solutions.

Previous research on Problem-Based Learning, game-based learning, and SWOT analysis indicates a gap in integrating these approaches into a single pedagogical model for marketing education in Indonesian higher education. Furthermore, previous studies were mostly conducted within specific institutional contexts, limiting the transferability of their findings to other higher education settings. This study addresses this gap by developing and evaluating the SI-M-SWOT model—piloted with 133 students across four universities in East Java, Indonesia, and evaluated using inferential statistical analysis. By examining the model across multiple institutional contexts, this study provides empirical evidence on the potential applicability of an integrated learning model for teaching SWOT analysis in higher education.

This study intends to develop and evaluate an interactive learning model, SI-M-SWOT, which integrates game-based technology with a Problem-Based Learning (PBL) approach. The model is designed to support students' understanding of SWOT analysis, develop critical thinking skills, and promote active participation in marketing learning activities. By combining experiential learning principles with interactive digital media, the SI-M-SWOT model is expected to provide a more engaging and contextually relevant learning experience in marketing education.

2. Literature Review

2.1. Use of technology and gamification in learning

The integration of technology and gamification into educational practices has become increasingly relevant in contemporary learning environments. Technology-enhanced learning approaches enable educators to design more interactive and engaging learning activities, while gamification elements, such as points, challenges, and rewards, can support student motivation and

participation. Gamification-assisted learning models have the potential to enhance students' Higher-Order Thinking Skills (HOTS). These findings suggest that gamification mechanisms can contribute to a more active and engaging learning process.

Previous studies have also reported positive effects of gamification on student engagement and learning outcomes. Similarly, Limaymanta et al. (2021) highlighted the potential benefits of digital technology and the flipped classroom approach in supporting student learning. Taken together, these studies suggest that technology-supported learning, particularly through gamification and interactive platforms, may facilitate students' understanding of complex concepts, including strategic frameworks such as SWOT analysis.

2.2. Problem-Based Learning (PBL)

Problem-Based Learning (PBL) is widely used as a teaching approach to support the development of critical thinking and problem-solving skills. PBL emphasizes learning through the investigation of real-world problems, enabling students to develop analytical competencies and participate actively in the learning process. Dalila et al. (2022) reported that the implementation of PBL was associated with improvements in students' analytical and problem-solving skills at the secondary education level. This approach encourages students to identify problems critically, collaborate with peers, and formulate solutions through systematic reasoning.

Furthermore, Dogan (2017) demonstrated that integrating PBL into teaching can enrich students' understanding of scientific discourse and methodological reasoning. This finding is relevant to SWOT-based learning, which analyzes weaknesses, opportunities, and threats. SWOT-based learning also requires students to engage in systematic evaluation and strategic thinking. Furthermore, the use of technology in PBL allows students to access digital learning resources, such as interactive videos, while simultaneously facilitating simulations and encouraging engaging discussions. Such a learning environment supports self-directed learning and expands opportunities to develop analytical competencies.

2.3. The effectiveness of PBL for critical thinking and problem-solving skills.

The effectiveness of PBL in supporting the development of higher-order cognitive skills has been widely discussed in the literature. Previous research suggests that PBL can encourage students to analyze complex situations, communicate ideas effectively, think critically, and collaborate in solving real-world problems (Dalila et al., 2022). Similarly, Dogan (2017) reported that integrating PBL with a contextual learning approach can deepen students' conceptual understanding and strengthen their ability to apply theoretical knowledge to practical situations. In the context of marketing education, SWOT analysis is an important competency for students to develop. Through PBL, students can analyze situations, develop strategies, and formulate solutions within relevant theoretical frameworks. Accordingly, the application of PBL in marketing education can support students' conceptual understanding while also providing opportunities to develop practical competencies in marketing strategy analysis.

2.4. Integrating game technology and Problem-Based Learning (PBL) in marketing education.

Recent research suggests that combining gamification with Problem-Based Learning (PBL) can enhance learning experiences in marketing education. Gamification introduces interactive elements that can support student engagement, while PBL situates learning activities within authentic problem-solving contexts. Ramadhani and Wahyuningsih (2025) reported that integrating game-based learning with PBL can create a more dynamic and engaging learning environment. Their findings suggest that this combination may support students' analytical skills and their ability to apply SWOT concepts to real-world case studies.

The integration of gamification and PBL can support collaborative learning, promote active participation, and facilitate students' understanding of marketing strategies. By combining these approaches, educators can create learning environments that incorporate real-world business challenges and provide students with opportunities to develop strategic thinking skills through more interactive and meaningful learning activities.

2.5. Challenges and enabling factors in technology integration

Despite their potential benefits, the integration of technology and gamification into education also presents several challenges. Benzaghta et al. (2021) and Chugh et al. (2023) highlighted several factors that are important for the successful implementation of technology-enhanced learning innovations, including technology availability, instructor readiness, and institutional support. Limited access to technological resources and inadequate institutional support may hinder the effective implementation of these approaches.

Nevertheless, previous studies suggest that digital technology, gamification, and Problem-Based Learning (PBL) offer considerable potential for enhancing learning quality. When appropriately implemented, these approaches can support student motivation and engagement and contribute to the development of critical thinking skills. Therefore, strategic planning, adequate infrastructure, and continuous professional development for educators are important to support the sustainability and effectiveness of technology-enhanced learning innovations in higher education.

Based on the research problem and the proposed learning innovation, this study addresses the following research questions: 1) how is the game technology application developed as a learning innovation for SWOT marketing; 2) does the implementation of an interactive e-learning model have a positive impact on increasing student participation and understanding; and 3) does the combination of game-based technology and PBL effectively create a dynamic and interactive learning environment that enhances motivation, engagement, and analytical thinking?

3. Methodology

3.1. Research Design

Research and Development (R&D) with the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) framework is the primary approach in this study. ADDIE framework was chosen as a systematic structure for designing, developing, implementing, and evaluating learning models and learning materials. Within this framework, the SI-M-SWOT learning model integrates game-based technology with Problem-Based Learning (PBL) to support interactive learning in marketing education.

The ADDIE framework was selected because it provides a systematic structure for designing, developing, testing, and refining the SI-M-SWOT learning model, which integrates game-based technology with the Problem-Based Learning (PBL) approach. Details regarding the study population, sample, and participant recruitment procedures are presented in the following subsections.

3.2. Population and Sample

The study population consisted of undergraduate students enrolled in marketing or entrepreneurship courses at universities in East Java, Indonesia. Four universities, located in Jombang, Nganjuk, Bangkalan, and Pasuruan, East Java, were selected using purposive sampling based on the following criteria: (1) curricular relevance, specifically, the availability of Marketing or Entrepreneurship courses that include SWOT analysis content; (2) institutional readiness, including adequate technological infrastructure, such as internet connectivity and devices, to access the SI-M-SWOT application; and (3) instructor willingness to participate in the implementation and pilot testing of the learning model.

Research participants were recruited using purposive sampling based on the following criteria: (a) active enrollment as undergraduate students in Marketing or Entrepreneurship programs; (b) completion of SWOT analysis content as part of their course curriculum; and (c) willingness to participate in the full sequence of research activities, including the pre-test, implementation of the learning model, and post-test, as indicated by informed consent. Based on these criteria, 133 students participated in the study, comprising 34 students from Jombang, 27 from Nganjuk, 27 from Bangkalan, and 45 from Pasuruan. The variation in participant numbers across locations reflects differences in the number of students enrolled in the relevant courses during the semester in which the study was conducted. The inclusion of participants from four different locations was intended to capture variation across institutional contexts and provide broader evidence regarding the applicability of the SI-M-SWOT learning model.

3.3. Research instrument

The research instrument was developed through several stages to ensure its validity and reliability.

Stage One involved developing questionnaire items based on a literature review and a conceptual framework comprising five key variables: user satisfaction;

participation and collaboration; critical and analytical thinking; the influence of game-based media; and psychological and emotional aspects. This process resulted in 50 items measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Stage Two involved expert validation by specialists in e-learning and educational technology to assess the instrument's content validity, including the alignment of items with specified indicators, clarity of wording, and relevance to the context of marketing education. Expert feedback was used to revise items deemed ambiguous before the field trial.

Stage three involved piloting the revised instrument with 40 students who were not included in the main research sample to assess item validity and initial reliability. Item validity was evaluated using item total correlation coefficients (r) calculated with Pearson's product-moment correlation and compared with the critical r-value of 0.312 at the 5% significance level (N = 40). All 50 items yielded r-values ranging from 0.283 to 0.766. Because the lowest observed r-value exceeded the critical value, all 50 items were retained for subsequent analysis.

Stage Four involved assessing the instrument's internal consistency using Cronbach's alpha coefficient. The analysis yielded a Cronbach's alpha value of 0.857 across the N = 50 items, indicating good internal consistency and supporting the reliability of the instrument for use in the main study.

Stage Five involved refining the instrument based on the pilot test results by adjusting the wording of items that exhibited relatively low item-total correlation values ($r < 0.30$). This final instrument is the one used for pre-test and post-test purposes with 133 student participants.

3.4. Implementation Procedure

The SI-M-SWOT learning model was implemented through six sequential phases at each participating university, as follows:

1) Orientation. At the beginning of the course, the lecturer introduced the learning objectives, explained the workflow of the SI-M-SWOT application, and provided foundational material on SWOT analysis in a marketing context. A flipped classroom approach was employed, allowing students to study the basic materials independently before the face-to-face session.

2) Problem-Based Learning (PBL) Activities. Students were divided into small groups and assigned authentic business cases to analyze. With guidance from a facilitator, each group identified the problem, formulated investigative questions, and discussed the relevant information needed to address the case.

3) SWOT Simulation. Students selected one of several marketing SWOT scenarios provided through the SI-M-SWOT application based on their interests. They then analyzed the strengths, weaknesses, opportunities, and threats associated with the selected business scenario using the application's interactive simulation features.

4) Game-Based Learning Session. Students completed SWOT-themed challenges and interactive quizzes within the application, receiving immediate feedback on their strategic decisions and earning points as part of the gamification elements designed to support motivation to learn.

5) Classroom Implementation. Each group compiled its analysis into a video presentation, which was presented and discussed in class. Lecturers and students provided feedback, followed by discussions designed to deepen conceptual understanding and address misconceptions.

6) Evaluation. Students' understanding of SWOT analysis was assessed using a pre-test administered before the implementation and a post-test administered after completion of the full activity sequence, supplemented by a perception questionnaire. Formative evaluation was conducted throughout the learning phases through classroom observations and direct feedback from the lecturer, whereas summative evaluation was conducted at the end of the program to assess the overall effectiveness of the learning model.

The entire implementation process spans one academic semester, with the duration and schedule adjusted to the academic calendars of the respective participating universities.

3.5. Data collection

Data were collected through interviews, focus group discussions (FGDs), observations, and questionnaires conducted in three stages.

First, interviews and FGDs were conducted with four lecturers and ten student representatives to identify learning needs, perceptions, and challenges associated with conventional learning approaches.

Second, observations were carried out during the implementation of the SI-M-SWOT learning model to assess student participation, interaction, and engagement during learning activities.

Third, questionnaires were administered to assess students' perceptions of the learning model. The questionnaire used a five-point Likert scale with five dimensions: (1) user satisfaction; (2) participation and collaboration; (3) critical and analytical thinking; (4) the influence of game-based media; and (5) psychological and emotional aspects of learning. The response categories were Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. The questionnaire was piloted with 40 students.

3.6. Data analysis

Quantitative data from the pre-tests and post-tests were analyzed using descriptive statistics, including means and standard deviations, for each university location. To assess whether learning outcomes improved significantly, paired-sample t-tests were conducted to compare students' pre-test and post-test scores within each university. Cohen's d was also calculated to estimate the magnitude of the observed differences. All statistical tests were conducted at a significance level of 5% ($\alpha = 0.05$). Qualitative data from observations, interviews,

and focus group discussions (FGDs) were analyzed thematically to complement and contextualize the quantitative findings.

3.7. ADDIE Model stages

The implementation of the ADDIE framework in developing the SI-M-SWOT model comprised the following five stages:

1) Needs Analysis. This stage involved identifying learning challenges and existing practices in teaching marketing SWOT analysis, exploring learning needs through interviews and focus group discussions (FGDs) with lecturers and students (see Section 3.5, Data Collection), and defining the competencies to be achieved and the target user profile for the application.

2) Design. This stage involved designing a PBL-based learning structure integrated with gamification elements, including SWOT simulations, discussion forums, and instructional videos; designing the SI-M-SWOT application interface; and preparing the research instruments (see Section 3.3, Research Instruments, for details on the validation and reliability procedures).

3) Development. This stage involved developing the interactive web-based SI-M-SWOT application, preparing learning content including instructional videos, simulations, and interactive quizzes, and validating the learning media through focus group discussions (FGDs) with educational technology experts and marketing lecturers.

4) Implementation. This stage involved field-testing the SI-M-SWOT learning model with 133 students from four universities, following the implementation procedures described in Section 3.4, Implementation Procedures.

5) Evaluation. This stage involved formative evaluation conducted throughout the development process and summative evaluation based on pre-test and post-test results and student feedback. The collected data were analyzed using the techniques described in Section 3.6, *Data Analysis*.

4. Results and Findings

4.1. Needs Analysis

The needs analysis phase was conducted through interviews and focus group discussions (FGDs) with four lecturers and ten student representatives (see Section 3.5, Data Collection) to identify the current conditions of learning in marketing SWOT analysis. The findings from this phase identified three key issues that informed the development of the SI-M-SWOT model: (1) low student engagement in learning, which was largely characterized by didactic lecture-based instruction; (2) difficulties in applying SWOT analysis concepts to real-world business cases; and (3) limited availability of interactive learning media for Marketing and Entrepreneurship courses.

These issues were identified through FGDs with lecturers regarding the challenges of teaching SWOT analysis using conventional methods. One lecturer explained: “Students often struggle to visualize the internal and external factors

of a company that needs to be analyzed in a SWOT assessment because they do not conduct direct interviews. We rely primarily on lectures. Therefore, we need interactive media that can help students better understand a company's situation."

Meanwhile, regarding their perceptions of the learning methods used before the implementation of SI-M-SWOT, students reported difficulties in understanding SWOT analysis. As one student participant (S1) remarked: "I find it confusing to identify and document the SWOT elements because I have never interviewed a business owner. Furthermore, lecturers tend to rely on lecture-based teaching." Based on these findings, the study defined the competencies students should achieve and the user profile for the SI-M-SWOT application, as detailed in section 3.7 (ADDIE Model Stages).

4.2. Design

A learning strategy integrating Problem-Based Learning (PBL) with game-based elements was expected to enhance student engagement in the learning process. Students reported positive perceptions of the SWOT simulation game, supporting its potential as a learning component in higher education marketing courses. Within the PBL framework, authentic scenarios serve as primary learning stimuli. Students are required to identify problems, gather relevant information, and construct understanding through independent and collaborative exploration. Collaboration plays a central role in PBL, as students work in small groups to discuss scenarios, explore alternative solutions, and reflect on learning outcomes (Yu & Zin, 2023). Reflective activities further reinforce conceptual understanding and support students' evaluation of the learning process (Wei et al., 2024).

Game-based learning can further enhance student motivation and engagement within the learning environment. An AI-integrated Learning Management System (LMS) can facilitate this approach by adapting learning materials and challenges to students' progress (Dahalan et al., 2024; Irwanto et al., 2024; Zainuddin 2024). In the SI-M-SWOT model, the learning process unfolds through several sequential stages. First, students are introduced to real-world business scenarios involving marketing challenges faced by small and medium-sized enterprises (SMEs), digital startups, or businesses in the cultural tourism sector. These authentic cases serve as learning stimuli, enabling students to connect SWOT analysis concepts with real-world business situations (Suharti et al., 2024).

Next, students collect and analyze data through systematic research, interviews, and contextual analysis of market conditions. This investigative process develops students' research skills and analytical thinking (Savitska & Krychkivska, 2022). Subsequently, students conduct a SWOT analysis by identifying strengths, weaknesses, opportunities, and threats based on the collected data.

The next stage involves team discussions in which students examine the collected data, compare perspectives, and synthesize their findings. Students then present their analyses through short video presentations lasting five to seven minutes. Digital presentations have been shown to support the development of

communication and storytelling skills while increasing students' motivation to share innovative ideas (Ramadhani & Wahyuningsih, 2025).

To further promote engagement, SI-M-SWOT incorporates several gamification elements, including a point system, leaderboards, digital certificates, and peer assessment. These features have been associated with increased motivation and active participation in learning environments (Habibie et al., 2025). The final stage involves reflection and feedback. Students reflect on their learning experiences, the challenges they encountered, and the strategies they used to overcome them. Instructors and peers provide constructive feedback to support reflective learning and the development of metacognitive awareness (Suharti et al., 2024).

4.3. Development

During the development phase, the SI-M-SWOT learning platform was designed and validated through focus group discussions (FGDs) involving lecturers, educational technology experts, and relevant stakeholders. The development process focused on creating an integrated learning platform that combines Problem-Based Learning (PBL) with game-based technology to support interactive learning of SWOT analysis.

The system architecture was designed to accommodate three primary user roles: administrator, lecturer, and student. Each role has specific responsibilities within the learning management system. Administrators manage user accounts and system access; lecturers manage course materials and learning activities; and students participate in learning through assignments, discussions, and case-based simulations.

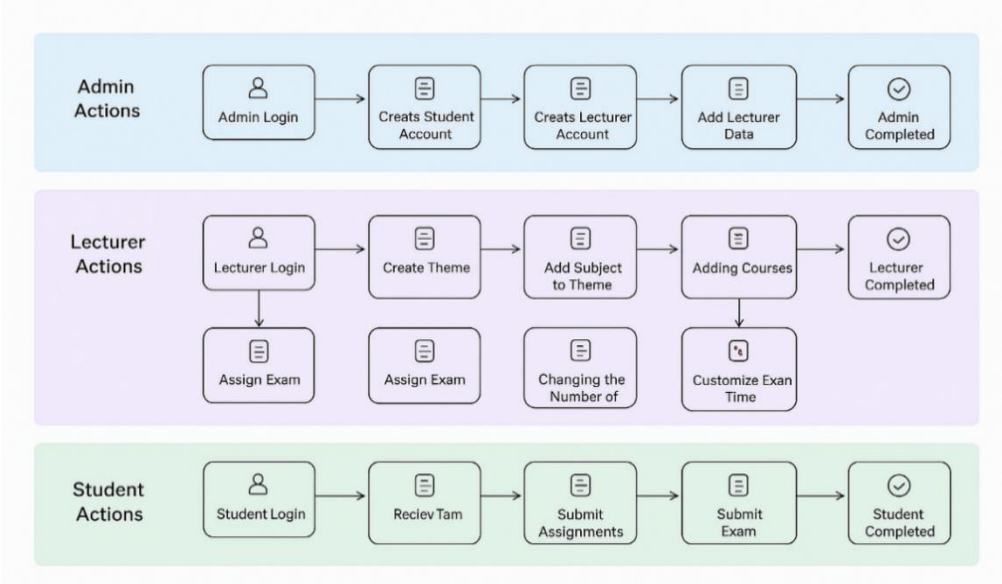


Figure 1: Workflow of the SI-M-SWOT Academic Management System

The diagram in Figure 1 illustrates a structured academic workflow that integrates the roles of the administrator, lecturer, and students within a digital learning platform. Three parties are involved in the learning process: (a) the administrator

ensures proper account setup and system access; (b) the lecturer manages learning activities, assignments, and assessments; and (c) students participate in the learning process by completing tasks, conducting SWOT analysis simulations, and submitting evaluation assignments.

Figure 1 illustrates a structured learning workflow that integrates the roles of administrators, lecturers, and students within the digital learning platform. Three user groups are involved in the learning process: (a) administrators, who are responsible for account setup and system access; (b) lecturers, who manage learning activities, assignments, and assessments; and (c) students, who participate in the learning process by completing tasks, conducting SWOT analysis simulations, and submitting assessment assignments.

This integrated workflow supports the efficient, transparent, and effective management of digital learning activities within the SI-M-SWOT platform. Throughout the learning process, students work in groups to conduct a SWOT analysis of a selected case scenario, identifying the strengths, weaknesses, opportunities, and threats of the business being analyzed.

The collaborative nature of this activity encourages students to exchange perspectives, share responsibilities, and develop marketing strategy recommendations based on evidence analysis. Throughout the learning process, the instructor provides formative feedback to help students refine their SWOT analyses and ensure the accuracy of their findings.

For the final evaluation, students are required to upload their group presentation videos to the Learning Management System (LMS). In addition, reflection sessions are conducted through discussion forums and synchronous video conferences. These sessions enable students to reflect on their learning experiences, compare strategies with those developed by other groups, and receive constructive feedback from peers and instructors.

Through this structured learning process, the SI-M-SWOT platform provides an interactive learning environment that integrates collaborative learning, strategic analysis, and digital technology to support the development of students' analytical and problem-solving skills in marketing education.

4.4. Implementation

The implementation phase of the SI-M-SWOT learning model in marketing courses at participating universities in East Java, Indonesia. A total of 133 students participated in the learning activities. Before implementation, lecturers received training on the effective use of the SI-M-SWOT platform during class sessions. The results of the descriptive statistical analysis are presented in Table 1.

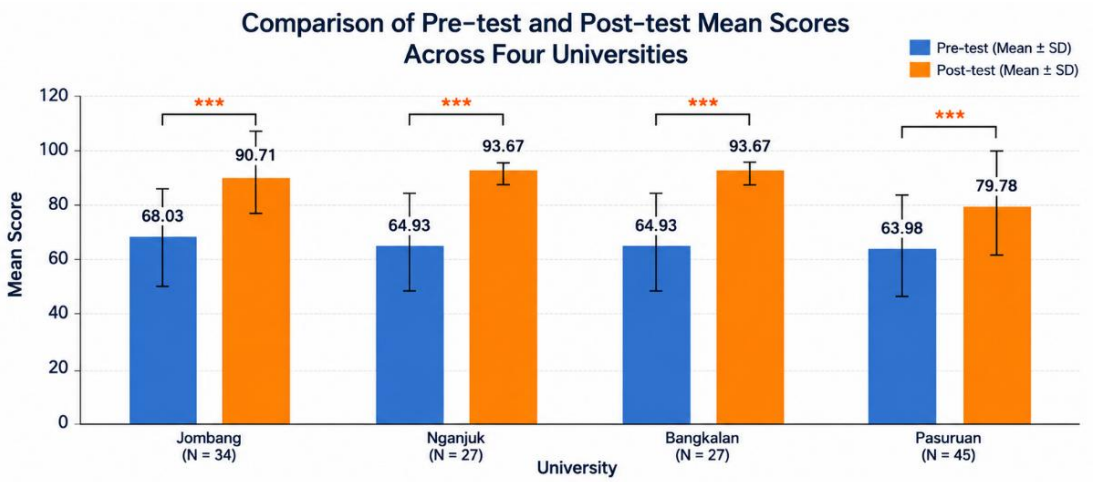
Table 1: Descriptive Analysis

	Aspects	**Goods**	Method	Median	SD	Category
1	User Satisfaction	10	4.65	5.00	0.42	Very high
2	Participation & Collaboration	10	4.58	5.00	0.48	Very high
3	Critical Thinking & Analysis	10	4.52	5.00	0.50	Very high
4	Influence of Game-Based Media	10	4.70	5.00	0.38	Very high
5	Psychological & Emotional Aspects	10	4.63	5.00	0.44	Very high

The results showed that student perceptions across all assessed aspects fell within the "Very High" category. Students reported a high level of satisfaction with the SI-M-SWOT platform, particularly regarding the relevance of the learning materials, the user-friendly interface, and the engaging learning experience. The learning model also supported student participation and collaboration through teamwork and interactive discussions. Furthermore, students reported improvements in critical thinking, analytical skills in conducting SWOT analyses, and their ability to develop marketing strategies. The gamification features were also perceived to enhance academic enthusiasm and support knowledge retention.

4.5 Evaluation

The evaluation phase encompassed both formative and summative assessments. A pre-test was administered at the beginning of the learning process to gauge students' initial understanding of SWOT analysis. Following the completion of learning activities using the SI-M-SWOT system, a post-test was conducted to measure student learning outcomes.



University	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference (Post – Pre)	t-value	df	p-value (2-tailed)	Interpretation
Jombang	68.03 ± 17.18	90.71 ± 13.95	22.68	-6.160	33	< 0.001	*** Significant improvement
Nganjuk	64.93 ± 15.23	93.67 ± 4.15	28.74	-9.679	26	< 0.001	*** Significant improvement
Bangkalan	64.93 ± 15.23	93.67 ± 4.15	28.74	-9.679	26	< 0.001	*** Significant improvement
Pasuruan	63.98 ± 17.59	79.78 ± 17.65	15.80	-3.931	44	< 0.001	*** Significant improvement

Note: Error bars represent standard deviation (SD). *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figure 1: Comparison of Pre-test and Post-test Mean Scores Across Four Universities and Paired-Sample t-test Results

The findings consistently indicate that the SI-M-SWOT learning model is associated with improved student learning outcomes across all participating universities. Statistical analysis revealed a significant difference between pre-test and post-test scores ($p < 0.001$). These results indicate that the SI-M-SWOT model in marketing education contributed to improved student learning outcomes across all participating institutions. The consistent improvement in student mean scores across all four universities suggests that this model has potential for implementation across a variety of higher education settings. These findings support the potential of SI-M-SWOT as an innovative learning model for university-level marketing education.

However, several challenges were identified during implementation, including limited internet infrastructure in certain regions, technical difficulties in operating the application, and the need for instructors to adapt to new digital learning tools. Despite these challenges, the implementation of SI-M-SWOT was associated with improvements in students' conceptual understanding, critical thinking skills, and active participation in learning activities. Overall, the findings suggest that the SI-M-SWOT model has potential for implementation in marketing and entrepreneurship education across diverse higher education settings. Future research should examine the long-term effects of the SI-M-SWOT model on the development of students' soft skills and career readiness.

4.6. Qualitative findings: observations, Focus Group Discussions (FGDs), and interviews

To complement the quantitative findings presented in Sections 4.4 and 4.5, this study also collected qualitative data through classroom observations, focus group discussions (FGDs), and interviews conducted during the implementation of the SI-M-SWOT model. A summary of the findings from each data collection method is presented below.

4.6.1. Classroom Observations

Observations conducted during the marketing course revealed that the SI-M-SWOT model fostered active interaction among students within their groups. Students engaged in discussions and debates regarding the topics at hand, supporting their viewpoints with clear explanations. They also participated enthusiastically in activities, particularly when interacting with the platform's game-based features. Furthermore, the model enhanced teamwork, as group members collaboratively identified correct answers whenever a peer selected an incorrect response.

4.6.2. Focus Group Discussions (FGDs)

The FGDs involved both lecturers and students. One of the key issues discussed by the lecturers was the ease of use of the SI-M-SWOT application. Lecturers noted that the SWOT marketing game was well suited to develop students' critical thinking skills. For example, the SI-M-SWOT application could present an incorrect concept, requiring students to identify the error, determine the correct concept, and provide sound arguments to support their conclusions. According to the lecturers, these game-based activities helped deepen students' understanding of marketing concepts and encouraged active participation in the

learning process. However, the lecturers also observed that some students tended to remain passive within their groups. Therefore, they recommended incorporating multiple scenarios into each game session to provide students with more opportunities to practice critical thinking.

4.6.3. Interviews

The interviews provided insights into lecturers' and students' perspectives on the impact of the SI-M-SWOT model on students' understanding of SWOT analysis, critical thinking skills, and learning motivation.

Lecturers A, B, and C stated: "The SI-M-SWOT application makes it easier for us to explain the distinction between internal and external factors in SWOT analysis. At the same time, students are highly enthusiastic about participating in the game, identifying incorrect concepts, and providing the rationale behind their answers. As lecturers, we need to reinforce their understanding by explaining why their arguments are considered correct or incorrect."

Meanwhile, Lecturers C and D stated: "The SI-M-SWOT application enables students to take a more active role in identifying incorrect marketing concepts and explaining the reasons behind their misconceptions. The learning activity becomes more challenging because students are required to provide a rationale for each marketing concept discussed."

Based on the student interviews, Students 1 and 2 remarked: "Initially, I was confused about identifying errors in the marketing SWOT game. However, after reviewing the theory, I was able to identify the incorrect marketing concepts and explain why I considered them incorrect."

Other students (Students 3, 5, 6, and 7) stated: "The game is very enjoyable. It encourages us to think critically to identify the reasons behind the answers, and we engage in discussions and debates with one another."

Meanwhile, Students 4, 8, 9, and 10 stated: "The marketing SWOT game is highly engaging and makes it easier for us to understand marketing concepts. The SI-M-SWOT application incorporates a 'trap' element by presenting incorrect marketing concepts alongside correct ones. We feel more motivated to examine the material carefully and identify the errors, which helps us recognize the correct concepts. Through this 'trap' game technique, we gain a better understanding of marketing concepts."

Overall, these qualitative findings provide further insight into the quantitative results presented in Sections 4.4 and 4.5 by illustrating how the SI-M-SWOT application supported students' engagement, critical thinking, and understanding of marketing concepts.

5. Discussion

This study found that the SI-M-SWOT model was associated with significant improvements in students' understanding of SWOT analysis, critical thinking skills, and active participation in marketing learning activities, as indicated by the paired-sample t-test results across the participating universities ($p < 0.001$; Cohen's $d = 0.59–1.86$; see Section 4.5). The integration of Problem-Based Learning with game-based learning provides a potentially effective approach to supporting student-centered learning in marketing education.

These findings can be explained by the nature of Problem-Based Learning (PBL), which encourages students to engage actively in structured inquiry and collaborative discussion. Through this process, students are challenged to identify relevant information, generate alternative solutions, and construct logical arguments. Such activities support the development of critical thinking skills that are essential for conducting SWOT analysis. These findings are consistent with those of Chugh et al. (2023) and Rosário and Dias (2024), who reported that PBL in business and marketing education can bridge the gap between theoretical knowledge and practical application while strengthening students' critical thinking skills. The findings also align with Dalila et al. (2022), who found that PBL can contribute to the development of students' analytical and problem-solving skills.

The features of SI-M-SWOT, including simulations, interactive challenges, and immediate feedback, create a dynamic and engaging learning environment. These findings are consistent with a systematic review by Dahalan et al. (2024), which reported that gamification and game-based learning can increase student engagement and motivation in various educational contexts. These findings also align with Habibie et al. (2025), who found that gamification elements implemented in digital learning platforms can encourage active student participation. In this study, students showed enthusiasm when completing marketing case scenarios. This is consistent with findings reported in previous studies.

In the present study, students were observed to participate actively in discussions and demonstrate enthusiasm when solving marketing case scenarios, consistent with findings reported in previous studies. This study extends existing research by integrating Problem-Based Learning (PBL) and game-based learning into a single instructional model specifically designed to support SWOT analysis in marketing education. Ramadhani and Wahyuningsih (2025) reported that integrating gamification with PBL can strengthen students' analytical skills in applying SWOT concepts. However, their study was conducted at a single institution and did not employ a systematic instructional development framework or inferential statistical testing.

In contrast, the present study employed the ADDIE framework to develop and evaluate the SI-M-SWOT model and implemented it with 133 students from four universities. This multi-institutional implementation, together with inferential statistical analysis, provides additional empirical support for the model's

compatibility across different higher education settings. Thus, the SI-M-SWOT model extends previous research by integrating established pedagogical approaches within a systematically developed model and evaluating its implementation across multiple institutional contexts. Theoretically, this research supports the view that combining active learning approaches with digital technology can enhance higher-order thinking skills (Dahalan et al., 2024). The integration of problem-based learning and game-based learning can create a synergistic effect. Cognitive engagement is strengthened through problem-solving activities, while emotional engagement and learning motivation are supported by gamification elements.

In practical terms, the SI-M-SWOT model offers an innovative instructional strategy for marketing and entrepreneurship education. This finding is consistent with Motta and Galina (2023), who reported that experiential learning can strengthen students' entrepreneurial competencies and motivation to learn. The model requires educators to design interactive learning activities that are closely aligned with authentic business contexts. The flexible, technology-enabled design allows the SI-M-SWOT model to be adapted and implemented across a variety of higher education environments.

However, several challenges were identified during implementation, including limitations in technological infrastructure and the need for lecturers to adapt to digital learning environments. These findings are consistent with Chugh et al. (2023), who emphasized that the successful implementation of educational technology in higher education depends on infrastructure readiness, stakeholder perceptions, and adequate institutional support. Accordingly, the effective implementation of technology-based learning models such as SI-M-SWOT requires sustained institutional support, continuous professional development for lecturers, and adequate technological infrastructure.

6. Conclusion

6.1. Development of the SI-M-SWOT Model

The development of SI-M-SWOT resulted in an interactive learning model that integrates game-based technology with a Problem-Based Learning (PBL) approach for teaching marketing SWOT analysis. The model was designed to support students' understanding of SWOT analysis, critical thinking, and active participation in marketing learning activities.

6.2. Implementation and Learning Outcomes

The implementation of the SI-M-SWOT learning model was associated with significant improvements in students' learning outcomes, as indicated by the differences between pre-test and post-test scores across the participating universities. The model provides an interactive e-learning environment that supports student participation, conceptual understanding, and problem-focused learning in marketing and entrepreneurship education at the university level.

6.3. Contribution of Game-Based PBL

The integration of game-based technology and Problem-Based Learning (PBL) is a potentially effective approach for creating a dynamic and interactive learning environment. This approach also supports student motivation, engagement, and analytical thinking. The combination of authentic problem-solving activities, SWOT simulations, interactive challenges, and immediate feedback provides students with the opportunity to apply theoretical concepts to contextual marketing problems.

7. Conflict of Interest

The authors declare that they have no conflicts of interest regarding the publication of this research.

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This study involved the voluntary participation of university students.
All participants were informed of the research objectives and asked to provide their consent to participate.

The data collected were used solely for research purposes and analyzed anonymously. Data supporting the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: NSS conceived the research idea and led the overall administration of the study. AG and AW conducted the literature review, developed the theoretical framework, designed the research methodology, and performed data analysis, including data collection and validation. AYA contributed to the interpretation of results, critically revised the manuscript, and managed visualization and formatting. All authors have read and approved the final manuscript.

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Appendix 1

Questionnaire on the Implementation of the SI-M-SWOT Technology-Based Game

A. User Satisfaction

1. I find the material presented through the SI-M-SWOT technology game easy to understand.
2. The SI-M-SWOT model increases my motivation to learn marketing material.
3. Using the technology game makes the learning process more enjoyable.
4. My knowledge of marketing improved after participating in learning using the SI-M-SWOT model.
5. I feel capable of applying the marketing concepts I have learned to real-life situations.
6. I feel more confident in understanding marketing material through the SI-M-SWOT application.
7. The implementation of the SI-M-SWOT model is highly effective in helping me understand the material in depth.
8. I am more interested and enthusiastic about learning through this game-based medium compared to conventional methods.
9. SI-M-SWOT-based learning helps me participate more actively in class discussions.
10. I gained a satisfying learning experience after engaging in SI-M-SWOT-based learning.

B: Participation and Collaboration

1. I actively express my opinions during group discussions.
2. I feel comfortable sharing ideas and opinions during the learning process.
3. I take the initiative to start group discussions when there are issues that need to be addressed.
4. I often help summarize discussion results and formulate group conclusions.
5. I participate in group discussions while paying attention to the opinions of other members.
6. I am able to manage internal group conflicts constructively.
7. I frequently respond to opinions expressed by other group members.
8. I collaborate with group members to effectively achieve learning objectives.
9. I take responsibility for my assigned part of the group task.
10. I feel that collaborating within the group enhances my understanding of the material.

C. Critical Thinking and Analysis

1. I can identify the main issues in marketing case studies.
2. I am able to compare various marketing theories based on critical thinking.
3. I am able to systematically break down the key components of a marketing strategy.
4. I am able to construct arguments based on relevant data and theory.
5. I can analyze the strengths and weaknesses of specific marketing strategies.
6. I can connect marketing theory concepts to real-world situations.
7. I am able to provide innovative solutions for complex marketing problems.
8. I can consider various solutions and select the most effective one.
9. I am able to analyze information and data.
10. I am able to draw rational conclusions based on the data analyzed.

D. Influence of Game-Based Media

1. The use of technology-based games in instruction makes the learning process more engaging and enjoyable.
2. The technology-based game learning model enhances my critical attitude toward the subject matter.
3. I easily grasp course material through the use of game technology in instruction.
4. The SI-M-SWOT model creates a more interactive and enjoyable classroom atmosphere.
5. I feel more engaged and motivated to learn through technology-based game media.
6. The use of technology-based games enables me to learn independently and creatively.
7. The SI-M-SWOT media makes me more interested and active in the learning process.
8. The implementation of technology-based games enhances the overall learning experience.
9. SI-M-SWOT-based learning helps me overcome boredom during the learning process.
10. The game-based technology model is effective in fostering a positive attitude toward learning.

E. Psychological and Emotional Aspects of Learning

1. I feel comfortable and confident expressing my opinions during group discussions.
2. I feel motivated and enthusiastic about participating in the learning process using the SI-M-SWOT model.
3. I do not feel stressed when participating in SI-M-SWOT-based learning.
4. I feel that this learning process helps reduce fear and hesitation regarding public speaking.
5. I feel that this learning experience has made me more confident in expressing my opinions.
6. I feel that the group atmosphere during instruction supports my learning process.
7. I enjoy the learning process and actively interact during SI-M-SWOT-based learning.
8. I am able to manage anxiety during SI-M-SWOT-based learning activities.
9. My self-confidence increases as I interact during SI-M-SWOT-based learning.
10. I feel more enthusiastic and energized when participating in the SI-M-SWOT-based learning